

What is claimed is:

1. An organic semiconductor element including an FET comprising:

a substrate;

5 a first conductive layer which is one of source/drain electrodes and is provided onto the substrate;

an organic semiconductor layer provided onto the first conductive layer;

10 a second conductive layer which is the other electrode of the source/drain electrodes and is provided onto the organic semiconductor layer; and

15 a gate electrode provided onto a side surface of the organic semiconductor layer or a surface of the organic semiconductor layer exposed by partially eliminating the second conductive layer and a side surface of the second conductive layer via an insulating layer.

2. The organic semiconductor element according to claim 1, wherein an organic semiconductor layer which reduces an energy barrier is provided between the first conductive layer and the organic semiconductor layer and/or between the second conductive layer and the organic semiconductor layer.

25 3. The organic semiconductor element according to claim 1, wherein the first conductive layer is provided over a wide range, the organic semiconductor layer and the second conductive layer are provided onto the first conductive layer so that their side surfaces are exposed together, and the gate electrode is provided via the insulating layer so as to cover the side surfaces

of the organic semiconductor layer and the second conductive layer.

4. The organic semiconductor element according to claim 1, wherein the first conductive layer, the organic semiconductor layer and the second conductive layer are provided so that their side surfaces are exposed together, and the gate electrode is provided via the insulating layer so as to cover the side surfaces of the first conductive layer, the organic semiconductor layer and the second conductive layer.

5. The organic semiconductor element according to claim 1, wherein the first conductive layer and the organic semiconductor layer are provided over a wide range, the second conductive layer is provided onto the organic semiconductor layer so that its side surface is exposed, and the gate electrode is provided via the insulating layer so as to cover the side surface of the second conductive layer.

6. An organic EL display device comprising:

a translucent substrate;

a translucent electrode provided onto the translucent substrate;

an EL organic layer provided onto the translucent electrode; and

a driving element, a switching element and a capacitor, which are provided on the EL organic layer by laminating,

wherein the driving element comprises a vertical transistor formed of a laminated structure of a first conductive layer, a first organic semiconductor layer and a second conductive

layer, and a gate electrode provided at least on a side surface of the second conductive layer via an insulating layer.

7. The organic EL display device according to claim 6, wherein an upper electrode of an organic EL section and the first conductive layer as one of source/drain electrodes of the driving element are provided as a common conductive layer or separated conductive layers between the EL organic layer and the driving element.

8. The organic EL display device according to claim 6, wherein the switching element is formed by a vertical FET which is configured so that the driving element is provided onto the EL organic layer, a part of a third conductive layer for a gate electrode formed on an upper surface of the driving element is one of source/drain electrodes of the switching element, and an organic semiconductor layer and a fourth conductive layer as the other electrode of the source/drain electrodes are laminated on the part of the third conductive layer.

9. The organic EL display device according to claim 6,

wherein the driving element and the switching element are provided separately in a driving element region and a switching element region on the EL organic layer in a plan view, and

wherein the switching element is a lateral FET in which the organic semiconductor layer for the switching element is formed continuously or simultaneously with the organic semiconductor layer of the driving element and a pair of source/drain electrodes are provided on the same surface of the

organic semiconductor layer so as to be spaced.

10. The organic EL display device according to claim 8, wherein the first organic semiconductor layer for the driving element is provided on the EL organic layer, the second conductive layer as one of the source/drain electrodes for the driving element is provided partially on the first organic semiconductor layer, and further comprising:

a first insulating layer as a gate insulating film for the driving element provided on an exposed surface;

10 a third conductive layer as the gate electrode for the driving element and as one of the source/drain electrodes for the switching element provided on the first insulating layer;

a second organic semiconductor layer for the switching element provided on the third conductive layer in a switching element region provided with the switching element;

15 a fourth conductive layer as the other electrode of the source/drain electrodes for the switching element provided partially on the second organic semiconductor layer;

a second insulating layer as dielectric layer of the capacitor and as a gate insulating film for the switching element provided on the third conductive layer in a driving element region provided with the driving element, and the exposed portion of the second organic semiconductor layer and the fourth conductive layer in the switching element region;

25 a fifth conductive layer as a gate electrode for the switching element provided on the second insulating layer in the switching element region; and

a sixth conductive layer as an electrode of the capacitor provided on the second insulating layer in the driving element region.

11. The organic EL display device according to claim 5 9, wherein a third insulating layer is provided on the EL organic layer in the switching element region, the first organic semiconductor layer for the driving element and the switching element is provided on the third insulating layer and the EL organic layer in the driving element region, and the second 10 conductive layer as the other electrode of the source/drain electrodes for the driving element is provided partially on the first organic semiconductor layer in the driving element region, further comprising:

seventh and eighth conductive layers as the source 15 electrode and the drain electrode for the switching element provided on the first organic semiconductor layer in the switching element region so as to be separated;

a first insulating layer as a gate insulating film for the driving element provided on an exposed portion of the first 20 organic semiconductor layer and the second conductive layer in the driving element region;

a fourth insulating layer as a gate insulating film for the switching element provided on an exposed portion of the first organic semiconductor layer and the seventh and eighth conductive 25 layers in the switching element region so that a part of the seventh or eighth conductive layer is exposed;

a third conductive layer as a gate electrode for the

driving element provided on the first insulating layer so as to be electrically connected to the exposed portion of the seventh or eighth conductive layer;

5 a fifth conductive layer as a gate electrode for the switching element provided on the fourth insulating layer;

a second insulating layer as a dielectric layer of the capacitor provided on the third conductive layer; and

a sixth conductive layer as an electrode of the capacitor provided on the second insulating layer.

10 12. The organic EL display device according to claim 10 or 11, wherein an upper electrode of the organic EL section and the first conductive layer as one of the source/drain electrodes of the driving element are provided as a common conductive layer or separate conductive layers between the EL
15 organic layer and the first organic semiconductor layer.